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RANGE IMPROVEMENT



VOL. 9, NO. 4

NOTES

OCT. 1964

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(AGRI-OGDEN)

STATEMENT OF PURPOSE

- - -

This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "notes" may include extracts of published work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

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RESEARCH SHOWS
SPRING GRAZING CRITICAL
TO
DESERT RANGES

Taken from
Utah Farm & Home Science, Agricultural Experiment Station
Utah State University, Logan, Utah - Vol. 25, No. 1, 1964

By
C. W. Cook and L. A. Stoddart*

Desert ranges of the Intermountain Region are mostly grazed by sheep and cattle from October to April or May. However, some are used yearlong by cattle. The dates that these ranges are grazed are important because desert plants have only one season in which they can grow. Growth begins generally in late March and continues until the dry season in June. The vegetation is dormant during the rest of the year, except following unusually heavy summer rains.

Plants, as all other forms of life, must have food to survive. They are the only organisms that make their own food and all animal life is dependent in turn upon the plants. Fortunately, the plant makes more food than it requires and the remainder can be used by animals. But we need to be careful that only the surplus is harvested. The basic requirement, needed for nutrition of the plant itself, must be left.

Food, mostly sugars, is made in the leaves. The more leaf surface, the more food that will be made. The food is then stored, part in the leaves but part in the stems and roots, too. Grazing range plants closely removes too much of the food factory - the leaves. This is generally thought to be less serious in the fall and winter when the year's manufacturing is completed. The same reasoning suggests that spring and early summer grazing, when the factory is in full force, is more serious.

Research started

The Station recently has conducted basic studies on typical salt-desert ranges in western Utah to try to measure the role of season of grazing and

*Dr. Cook, assistant dean of the College of Forest, Range, and Wildlife Management in charge of research and Dr. L. A. Stoddart, head of the Department of Range Management. The study reported here is cooperative between the Utah Station and the Bureau of Land Management.

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its influence on range plant health. Remember that these deserts are dry and often the soils are forbiddingly salty. The life of a plant is not an easy one, even when undisturbed. It is important, then, to limit grazing to a season and intensity that will not harm the plants beyond tolerable limits.

A two-phase study was conducted to determine the physiological response of important forage plants to different seasons and intensities of grazing. The first phase was carried on from 1955 to 1957, and the second from 1958 to 1961. In each phase, seven species of range plants were subjected to three successive years of treatment.

During the first phase, the plants were harvested at three intensities during each of four seasons (figure 1). They were harvested by hand in a manner simulating forage removal by grazing animals. The three intensities were 25, 50, and 75 percent of herbage removal.



Figure 1

Removing a precise percentage of foliage with a knife enabled researchers to evaluate the effects of season and intensity of grazing on desert forage plants.

It is important to note that the results of this study are not intended to be used as a basis for making decisions about the use of the system. The results are only intended to provide a general overview of the system's performance.

A large number of factors can affect the results of the study. The most important factors are the quality of the data, the quality of the system, and the quality of the analysis. The results of the study are only as good as the data and the system used.

During the study, the system was used to process a large number of requests. The results of the study show that the system is able to process a large number of requests in a short period of time. The results also show that the system is able to handle a large number of requests at the same time.



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The four seasons were fall (November 1), early winter (January 1), late winter (March 1), and spring. The plants were clipped in the spring when they had made about 20 percent of their annual growth, usually about May 1. The seven species were all long-lived perennial forage plants including big sagebrush (Artemisia tridentata), black sagebrush (Artemisia nova), shadscale (Atriplex confertifolia), Nuttall saltbrush (Atriplex nuttallii), winterfat or white sage (Eurotia lanata), (figures 2 and 3) squirreltail grass (Sitanion hystrix), and Indian ricegrass (Oryzopsis hymenoides) (figures 4 and 5).

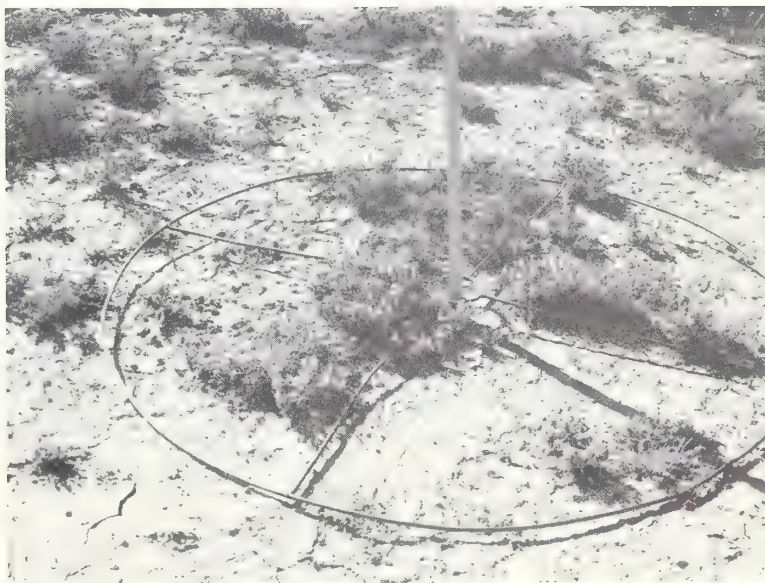


Figure 2

A plot of white sage as it looked before treatment.

Figure 3

The same plot of white sage after it had been harvested at 90 percent for three years during late spring (May 1). The plot supports only remnants of former vigorous white sage plants but several vigorous halogeton plants have invaded the area.



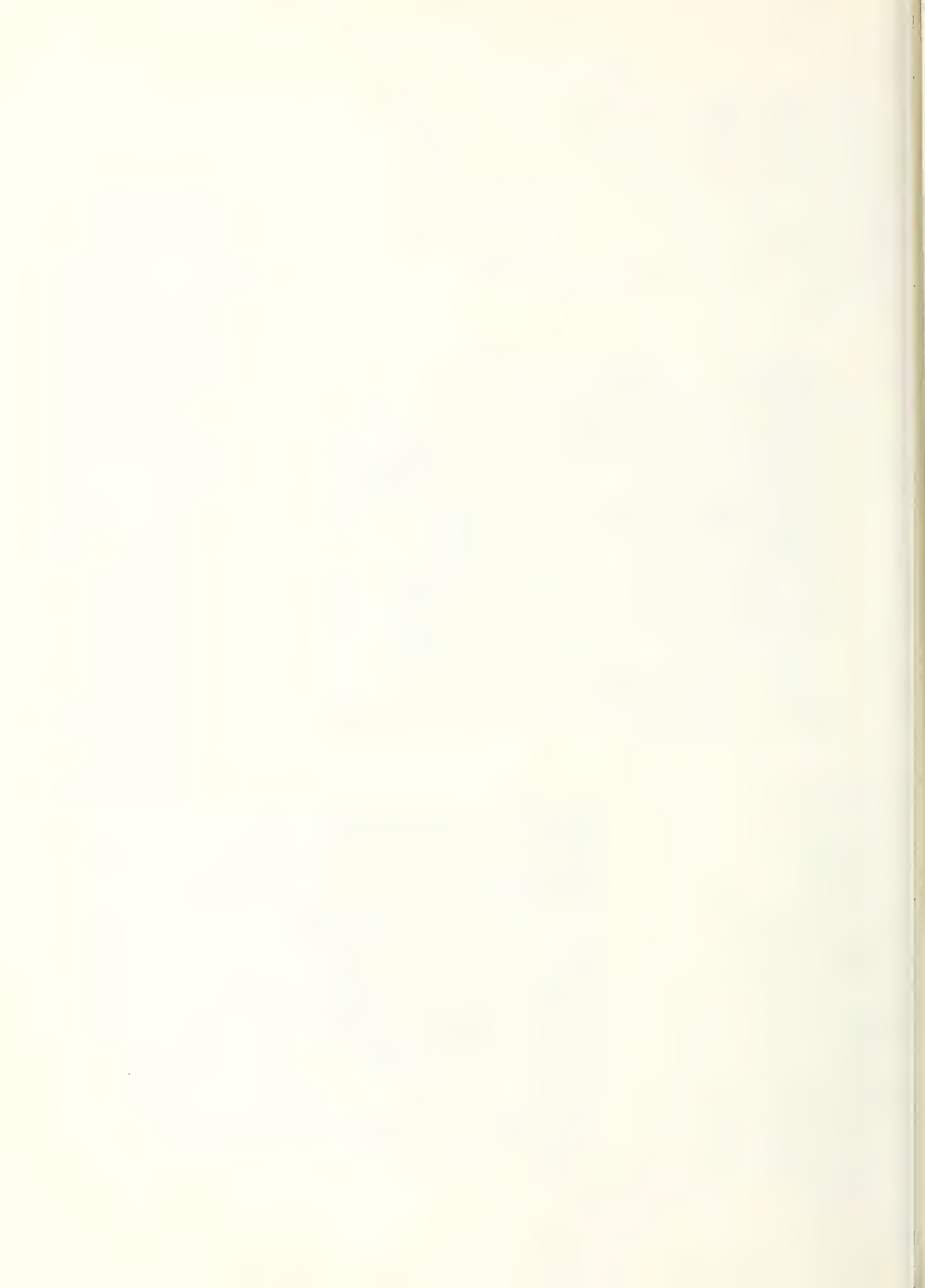




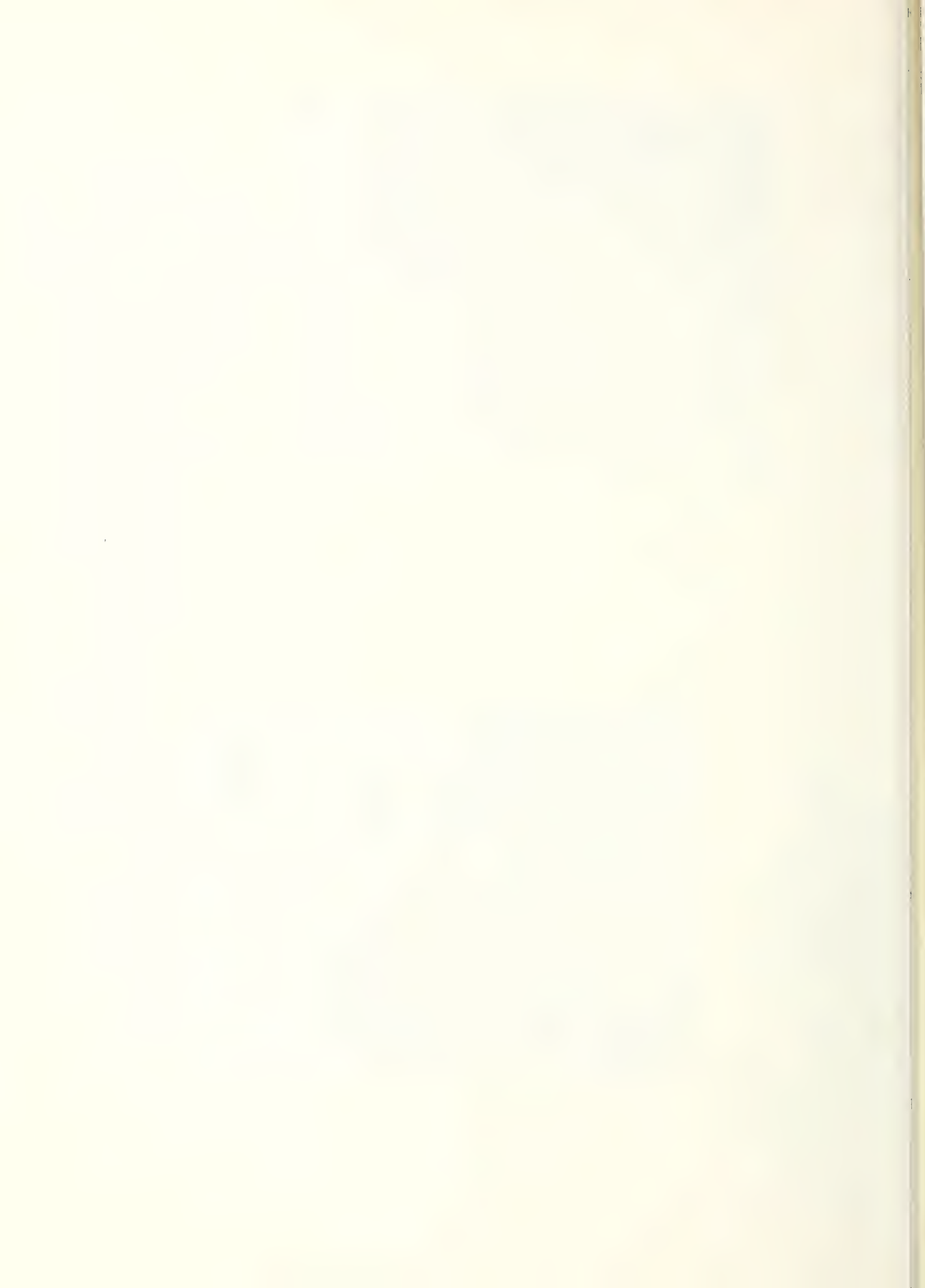
Figure 4

Once vigorous Indian ricegrass plant after being grazed at 90 percent in late spring (May 1) for three years.



Figure 5

Vigorous Indian ricegrass plant grazed at 60 percent only during winter for three years.



The work was repeated at two different locations about 90 miles apart and ten plants of each species were harvested for each treatment at each location.

The second phase of the study included the same species but a third location was added. The clipping treatments were made somewhat more severe - 30, 60, and 90 percent of the foliage was removed. The seasons also were changed slightly, the new ones being winter, early spring, and late spring. Early spring was defined as about the time new growth first appeared (usually April 1), and late spring as about the time 20 percent of the new growth had been produced (usually May 1).

The effect of these treatments on the range plants was determined in the late summer each year. Careful records were made of the death of any of these plants. Decreases in size of the remaining plants were also noted. The results of these records are shown in tables 1 and 2.

Table 1

Losses in numbers and size of desert range plants as a result of harvesting for three consecutive years at various seasons and intensities (Phase 1).

Grazing season	Percent of forage removed	Percent of the plants that died	Percent reduction in size of remaining live plants
Fall	25	5.1	10.8
(November 1)	50	6.4	11.9
	75	11.5	23.2
	Average	7.7	15.3
Early winter	25	2.8	9.8
(January 1)	50	5.7	11.6
	75	11.4	22.8
	Average	6.4	14.7
Late winter	25	2.6	11.5
(March 1)	50	5.0	10.4
	75	12.5	20.7
	Average	6.7	14.2
Spring	25	4.0	13.8
(May 1)	50	13.5	20.3
	75	22.7	34.1
	Average	13.1	22.7
Average of all seasons	25	3.6	11.5
	50	7.7	13.6
	75	14.5	25.2



Table 2

Losses in numbers and sizes of desert range plants as a result of harvesting for three consecutive years at various seasons and intensities (Phase 2).

Grazing season	Percent of forage removed	Percent of the plants that died	Percent reduction in size of remaining live plants
Fall	30	2.4	5.7
(January 1)	60	5.4	9.4
	90	20.1	28.5
	Average	9.3	14.5
Winter and late spring	30	6.7	17.9
(Jan. 1 and May 1)	60	20.1	34.1
	90	60.1	46.0
	Average	29.0	32.7
Early spring	30	2.5	3.0
(April)	60	5.8	14.5
	90	18.9	34.5
	Average	9.0	17.3
Late spring	30	4.0	6.9
(May 1)	60	12.6	17.5
	90	37.9	42.5
	Average	18.2	22.3
Average of all seasons	30	3.9	8.4
	60	11.0	25.1
	90	34.2	34.6

Effect of season of harvesting

In the first phase of the study, spring harvesting was much more detrimental than that of the other three seasons. It caused about 89 percent more death loss of plants and resulted in 54 percent more reduction in size of the remaining plants than did the other seasons (table 1). Fall, early winter, and late winter harvestings did not differ much in their effects.

Because spring grazing was so much more harmful in this first phase, greater emphasis was placed on spring harvesting in the second phase. In the second study, harvesting twice, once during the winter and again in late spring, was the most detrimental. Harvesting only in late spring was second most harmful. There was little difference between winter and early spring harvesting. Late spring grazing appeared to be considerably more detrimental than early spring.

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Harvesting during winter and again during late spring for three successive years killed an average of 29 percent of the plants and reduced the size of living plants about 33 percent (table 2). Of plants harvested only in late spring 18 percent were dead, and living plants suffered a 22 percent reduction in size. In contrast, early spring harvesting killed only 9 percent of the plants and reduced living plant size only 17 percent.

Effect of intensity of harvesting

Without exception, the more of the herbage that was removed, the more plants died and the smaller were the remaining plants. However, it can be seen from table 1 that differences in 25 and 50 percent herbage removal generally were small compared to differences between 50 and 75 percent removal. In the spring, however, even the 50 percent removal was impressively more harmful than was the 25 percent.

In the second phase, when harvesting was more intense, results were a little different (table 2). Except for plants harvested only in the winter, 60 percent herbage removal caused significantly more death loss and size reduction than 30 percent herbage removal, and 90 percent was significantly more detrimental than 60 percent.

Results of these studies are important to stockmen who use desert ranges. They show beyond question that stock need to leave the desert range as soon as growth of the shrubs is underway. This gives renewed emphasis to the need of Utah ranchers to develop crested wheatgrass pastures for early spring grazing.

Any grazing which removes over 25 to 30 percent of the desert plant herbage after about April 1 must be regarded as dangerous. This is especially serious when forage is removed during the winter and again in the spring. The amount should never exceed 30 percent in either season. The situation might occur when sheep graze winter range until late spring or when cattle graze desert ranges yearlong.

Stockmen should be aware that season of grazing affects grazing capacity. The number of animals we can safely put on ranges varies with how the range is used. Desert ranges are adapted to winter grazing. Our salt-shrub ranges are among the best in the world for use at this time of the year. But they are not adapted to spring use. If emergency situations make it necessary to graze them in the spring, then we cannot expect the range to carry the full number of animals. Data from this experiment suggest that the correct stocking on a range grazed in winter only is about twice that of the same range if grazed in the spring.



AN EVALUATION OF REVEGETATION PILOT PLOTS
ESTABLISHED ON NATIONAL FOREST RANGES
IN SOUTH CENTRAL NEVADA

By
Tom Stinson*

The Tonopah Ranger District has nine pilot revegetation exclosures in the sagebrush-grass type and two big game-livestock exclosures in the browse and pinyon-juniper types. Four 10-acre plots were established in 1957 and were treated in the following manner: Each plot was divided into four parts and each part received one of the following treatments: (1) sagebrush (Artemisia tridentata) sprayed with 2, 4-D; (2) plowed with wheatland plow once over, drilled to crested wheatgrass (Agropyron cristatum); (3) plowed and left fallow for one year, plowed second year, and drilled to crested wheat, intermediate wheat, pubescent wheat, and smooth brome grass, (4) untreated area given protection from cattle only.

The sprayed sagebrush area in the plots has shown remarkable recovery of the native grass species (figure 1): Sitanion hystrix, Stipa comata, Oryzopsis hymenoides, and Bouteloua gracilis. Due to the thick stand, plants appear at first glance to have been sown. They have attained a height of from 20 to 36 inches with an abundant seed production. It is estimated that some sprayed areas produced from 1,000 to 1,500 pounds per acre in 1963. This indicates that this method of treatment holds the most promise for rejuvenation of rangeland in this area. We do not feel that the sagebrush should all be killed, but that sagebrush spraying should be confined to areas that show the most potential by soil depth, presence of sufficient grass remnants to rejuvenate the range, and have at least 9 inches annual precipitation.

On the sprayed areas it took two years application by hand spraying to get a 100% kill with application of 2, 4-D in water with a detergent added.

The second area was plowed with a wheatland plow, then drilled to crested wheatgrass. Two of these plots had to be replowed and reseeded to get a satisfactory kill on the sage and a good stand of grass. After the second treatment, the plots had a very good stand of crested wheatgrass. The reason for failure the first year was probably the lack of moisture.

*Range Conservationist, Tonopah Ranger District
Toiyabe National Forest



The results of this treatment have been very good. However, the heavy use by rabbits and deer created a problem (figure 2). The areas reseeded contained the only green forage and offered the most palatable feed in the area, which has frequently resulted in complete use by rodents. In one of two areas seeded inside the rabbit tight exclosures, the grass headed and showed good growth, but growth did not equal that of native grasses. This points to the fact that these native species are better adapted to the climatic and natural conditions present in this area. It is believed that they should be used in conjunction with exotics in reseedings on the Tonopah Ranger District. They will also maintain themselves better than introduced exotics. If planted, it would be better to obtain seed from local areas to make them more adaptable. Some years germination of local seed may be difficult. This would be a good problem on which to conduct some trial work.

The third area in the plots was plowed with a 12-foot wheatland plow and left fallow the first year. The next year it was replowed and drilled to crested wheat and other wheatgrasses. This treatment did not prove to be satisfactory in any of the four plots. This treatment resulted in a very poor stand which was badly overgrazed by rabbits and deer. The dry year after planting was also responsible for the poor stand. In these areas either rabbitbrush (Chrysothamnus nauseosus) and big sagebrush came in to retake the seeding, or they have remained unvegetated. This has proven true on any area where the vegetative community was disturbed or removed without quickly replacing it with another to close it to invaders.

The fourth area was left untreated but given protection from livestock grazing. This area has shown some improvement over the outside, but not as noticeable as the sprayed areas. It is evident that the sagebrush is better adapted to the erratic moisture conditions because of its deep roots and drought-resistance.

If the sagebrush is killed by spraying and left, it will provide protection for grass seedlings to get established; it also releases the moisture for additional grass production.

The Saulsbury Study Plots were planted with 14 various grass species in the fall of 1950 by John Fenley of the Intermountain Forest and Range Experiment Station. The sagebrush was cleared from the experimental area by railing. A stock and rabbit-proof fenced enclosure, measuring 220 feet square, was erected on the cleared ground. The 14 species of forage plants were drilled in plots the length of the enclosure and in varying



widths between rows. There were no plants found after the first year. The second year there were scattered seedlings of intermediate and crested wheatgrass. Native Oryzopsis was scattered over the entire plot. In 1954, there were a few scattered seedlings of creeping rye, western wheat, Indian ricegrass, tall wheatgrass, Russian wildrye, and pubescent wheatgrass. Desert wheatgrass looked good. Oryzopsis was still scattered over the entire plot.

In a visit to the plot in 1963, the Russian wildrye showed greatest density and the most production with Oryzopsis still scattered over the plot. The intermediate crested wheatgrass and desert wheatgrass have scattered plants still alive and producing. These plants survived the years 1960 and 1961 which proved to be the worst drought years experienced in this part of the country in 75 years. There are many dead and decadent clumps in the enclosures that show the effect of the dry period. The conclusion drawn from this pilot plot is that we can successfully reseed this range with Russian wildrye with proper protection from livestock and rodents and the elimination of competition by spraying or plowing.

The plots on the Tonopah District have proved to be valuable trials in the rejuvenation of rangeland in Central Nevada. They merit continued study.

* * * * *

SAFETY MESSAGE

Speeder: A man who plays the hearses.



Figure 1

Close-up of sprayed area showing thrift of native grasses - 1961.



Figure 2

2 1/2 acres of plot seeded to crested wheat in 1957. Picture taken September 1961. Shows a good stand of crested wheat, but 90% utilization by deer and rabbits.



SUMMARY
Of
A GUIDE TO BITTERBRUSH SEEDING
In
CALIFORNIA

By
Richard L. Hubbard

U. S. Department of Agriculture, Forest Service
Pacific Southwest Forest and Range Experiment Station
in cooperation with
The Resources Agency of California
Department of Fish and Game

Berkeley, California
1964

Browse seeding is a valuable tool for the game range manager. It is needed most on important deer ranges where the browse has been destroyed by overgrazing or fire. Bitterbrush has proved best for browse seeding in northeastern California. It is highly palatable, well adapted to most of the critical deer winter ranges, and withstands grazing well.

Research has found how to seed bitterbrush. The prescription varies from site to site but, in general, our recommendations for California are:

1. Seed collection. Collect seed from areas similar to the planting site. The period between the time the seed ripens and falls is short, making it necessary to keep close watch on seed development.
2. Seed treatment. Bitterbrush seed has a dormancy which must be broken by over-wintering in the soil or artificial treatment.

For spring planting, we recommend soaking the seed in a 3-percent solution of thiourea for 3 to 5 minutes.

3. Site selection. Two factors must be considered in selecting a site: Where do we need to plant? Where will bitterbrush grow? Plantings should be made where they are needed but not on areas where deer grazing is so heavy that the young seedlings are sure to be killed. Planting

THE
OFFICE OF THE
SECRETARY OF THE
NAVY
WASHINGTON, D. C.
JANUARY 1, 1900

TO THE
HONORABLE
MEMBERS OF THE
NAVY DEPARTMENT
WASHINGTON, D. C.

SUBJECT: [Illegible]

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on such heavily grazed areas must be delayed until deer numbers are brought under control. The best guide to whether bitterbrush will grow on a site is whether it has grown there in the past. If this isn't known, soil surveys and other site evaluation are necessary. Bitterbrush should not be planted where the soil pH is above 7.3 in the top 5 feet or where drainage is poor.

4. Site preparation. Get rid of as much of the competing vegetation as possible, and prepare a smooth, firm seedbed. We recommend using a brushland plow, railroad iron drag, and large rollers.
5. Seeding. Plant the seed 1 inch deep on sites with soils which retain moisture well. On lighter soils, which lose moisture rapidly, plant the seed about 1 1/2 inches deep. The rangeland drill does the most efficient planting job. Mix 3 pounds of seed with 8 pounds of rice hulls to insure even seed distribution. Set the drill at 48 notches to seed 6 pounds of seed per acre. On some sites it is necessary to attach a roller behind the drill to firm the soil over the seed.
6. When to plant. We recommend spring planting on sites where spring precipitation is well distributed and the soil retains moisture well. On dry sites with light soils, fall planting is necessary.
7. Management of seeded bitterbrush stands. More is known about getting bitterbrush seedlings above ground than about what to do with them after they are established. Rabbits, deer, livestock, rodents, insects, high soil temperatures, fungi, frost heaving, and other factors all take their toll. Some can be controlled and some can't.

Between 500 and 2,200 established plants per acre constitute a successful bitterbrush seeding. Hbage production from 500 healthy, mature bitterbrush plants should maintain a 100-pound deer for about 70 days. A successful seeding isn't cheap. It costs about \$20.00 an acre for site preparation, seeding, and the seed. The question is: which is more expensive -- to leave deteriorated or burned deer range relatively unproductive, or bring it back into production?

A RAPID METHOD TO MANUFACTURE UNIFORM WIRE LOOPS
For
STAY LET-DOWN FENCES

By
William M. Nix*

Previous to 1964 we found we were spending too much time making wire loops for let-down fence construction. The methods used were costly and the work was being done during the field season. Loops were not uniform in size and the twists were not always neat. Considerable time was involved training employees to construct the loops, with additional followup necessary to see that they were properly made. To overcome these difficulties a method has been developed which has proven to be very satisfactory. The time required to make a loop has been cut in half, the loop is uniform and neat, and the twist end of the loop is easier to take hold of when dropping the let-down fence.

The loops are manufactured in the shop during the nonfield season. Loops are tied in bundles of 100 to facilitate handling and transportation to the job.

Figures 1, 2, and 3 on the following pages illustrate the method used and equipment needed to manufacture the loops.

*General District Assistant, Burley Ranger District
Sawtooth National Forest

* * * * *

Experience is not what happens to a man.
It is what a man does with what happens to him.

Aldous Huxley

Worry often gives a small thing a big shadow.

Swedish Proverb



METHOD OF CUTTING WIRE TO UNIFORM LENGTH FOR LET-DOWN FENCE LOOPS

1. Cut number of wires needed, length depending on size of loop wanted. (Usually 32" lengths.)
2. Cut a 1" or 1 1/4" length of galvanized pipe the same length as the wire used. Thread pipe on one end for pipe cap.
3. Clamp the pipe in a vise.
4. Place the No. 9 wire into the pipe until it reaches the pipe cap. Cut wire with fencing tool at pipe entrance. One man can do the job, producing uniform wire lengths. (See illustration.)

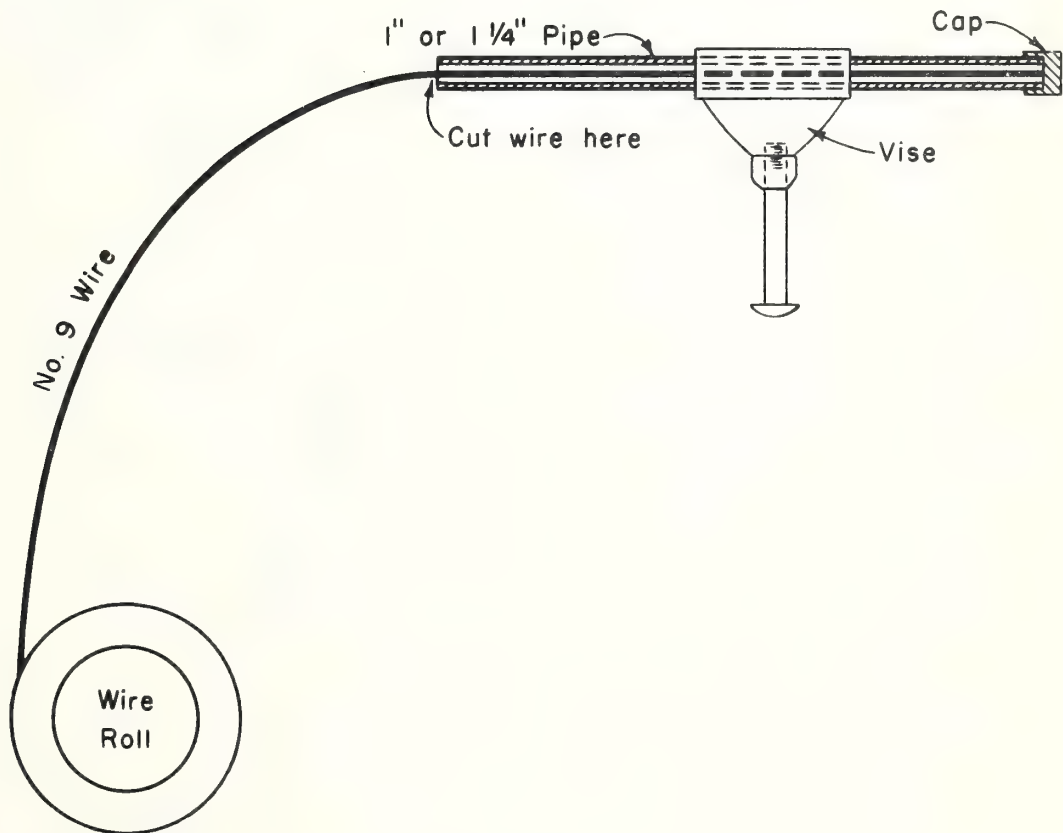


Figure 1



METHOD USED TO TWIST WIRE

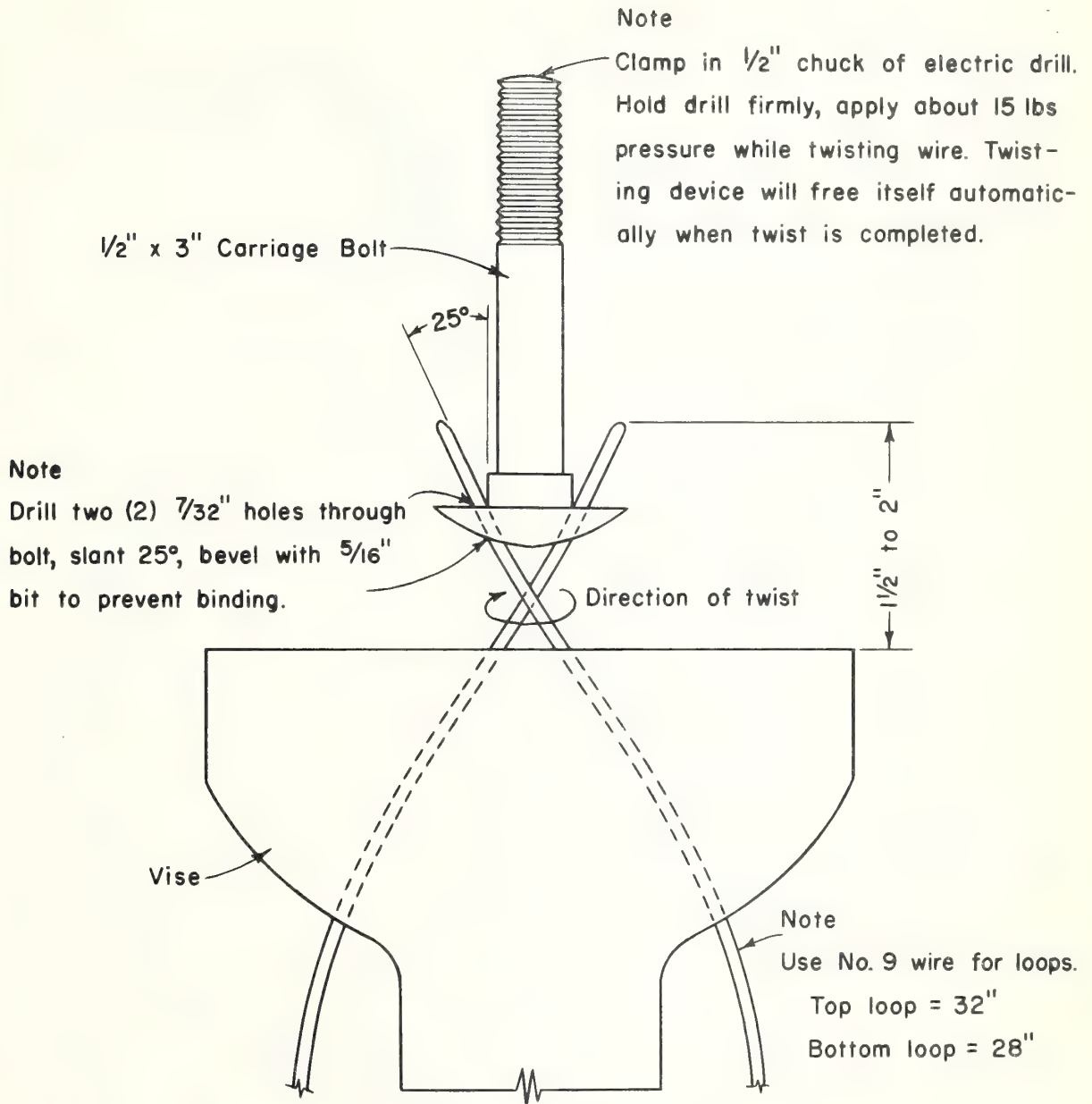


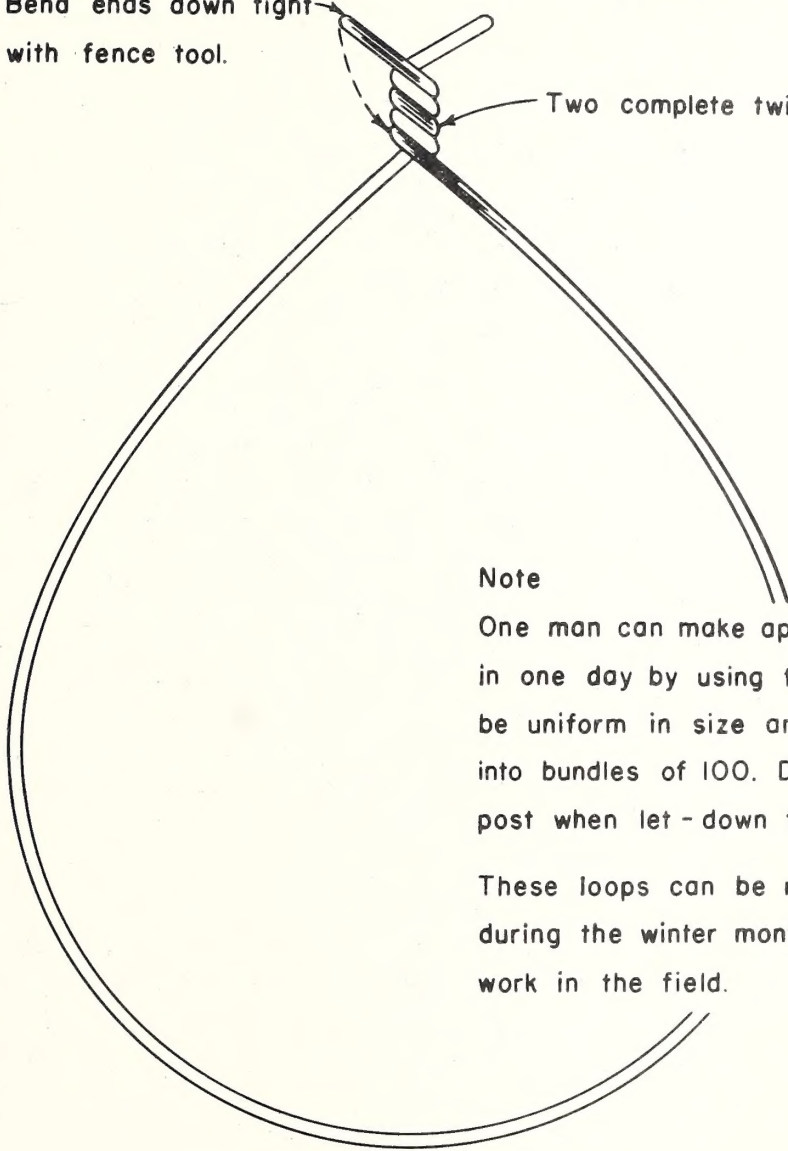
Figure 2



METHOD USED TO FINISH LOOP

Bend ends down tight
with fence tool.

Two complete twists



Note

One man can make approximately 300 loops in one day by using this system. They will be uniform in size and shape. Tie each size into bundles of 100. Drop two loops at each post when let-down fence is being constructed.

These loops can be made easily in the shop during the winter months when you cannot work in the field.

Figure 3

METHOD USED TO TURN LOOP

Bend ends down right
with fence post
Two complete loops



One man has made approximately 500 loops in one day by using this system. They are as uniform in size and shape as those made by hand. They are made by using a post when the 1st - down fence is being set. These loops can be made easily in the field during the winter months when you have work in the field.

Figure 3

